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The Curriculum

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Volume I **January, 1931** **Number 1**

THE CURRICULUM

Prepared by the Committee on the Curriculum: WILLIAM L. CONNOR, RALPH W. TYLER, HENRY HARAP, chairman; with the assistance of EDGAR DALE, L. THOMAS HOPKINS, and MARGARET A. NORTON.

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FOREWORD

THIS is the first number of the Review of Educational Research. Successive numbers will deal with special divisions in the entire field of education until the whole field is covered. The following review of the scientific work in the field of the curriculum illustrates the method which will be followed in the entire series. The purpose is to restrict the reviews to scientific studies, and to include, so far as possible, all the scientific investigations which bear upon the topic, either directly or indirectly. Each number includes a bibliography of the references upon which it is based.

A list of the topics which will be treated in early numbers of the Review is given in the back inside cover.

The curriculum was chosen as the subject for the first number because of the importance of the subject and of the availability of a large amount of scientific work in the field. In fact, the Editorial Committee which prepared the review was faced with an embarrassment of riches. Because it is necessary in the first number on each topic to review earlier studies, as well as those of the preceding three years, the description of the individual studies has necessarily been brief. In the subsequent cycles it will be possible to summarize the literature in greater detail.

An inspection of the Table of Contents reveals the general plan of this issue. The Review opens with a brief summary of the procedures which have been worked out for the study and revision of the curriculum in school systems. This is introductory to the more specifically scientific work. The chapters dealing with curriculum objectives, time allotment and grade placement, evaluation of curricula and texts, and public and private school curricula, obviously bear directly on the subject of this issue of the Review. While the chapters on the nature of the learning activities and on measuring ability and achievement deal with topics which bear less directly on the curriculum and which will be reviewed in detail in later issues of the Review, they nevertheless have an important bearing on the curriculum. Some duplication of subject matter treated in different settings is not objectionable.

The Editorial Board presents this first issue in the confident expectation that it will be of great service to teachers, administrators, and general students of education.

INTRODUCTION

THE scope of this review is based on the conception that the curriculum consists of all the experiences that a pupil has or is likely to have in school. Consequently all the research efforts which are immediately related to the generally accepted steps involved in selecting and conducting school activities are treated in this summary. It was our purpose not only to review the research studies, but to convey the impression that curriculum making is a coherent process. This aim accounts for the inclusion of certain small portions which would not rigorously be classified as research. In the selection of studies to be reviewed, the output of the last three years received greatest emphasis. Due to the limits of available space we were obliged to report the method and the results of research with only a small amount of critical comment.

The new technics of research developed and extensively applied in the last ten years of widespread curriculum revision are concerned with the determination of the objectives of courses of study. Usually, the investigator makes a direct or secondary analysis of life to discover the specific goals of the day-by-day learning which goes on in school. The direct analyses consist of the collection and interpretation of primary or first-hand data concerning the activities, interests, and needs of learners. When the analysis is concerned with vocational life, it is designated, more strictly, as job analysis. The studies of secondary data also have for their purpose a discovery of the activities, interests, or needs of the pupils, but the data are collected from sources that are not primary, such as social statistics, public documents, competent opinion, social treatises, newspapers, and magazines.

Old research procedures stimulated by the curriculum making movement and consciously used in coherent programs of curriculum revision are familiar to the student of the literature of educational research. These procedures include: Studies to determine most effective learning activities in a given subject; the construction and perfection of instruments to test the results of learning; analysis of the amount and distribution of practice for effective learning of the various subjects; analysis of, and experimentation with, the methods of adapting learning to individuals; studies to determine the time to be allotted to the various subjects; studies of the placement of units of work in their appropriate grades; studies in the appraisal of courses of study and textbooks; and experimentation with various kinds of learning activity in public and private schools.

The first chapter is concerned with certain general phases of curriculum making. It reviews the general works in curriculum making, indicates how the steps in the procedure of curriculum making were isolated, summarizes

the more important discussions of guiding principles, and reviews the most common steps in the organization of the personnel for curriculum making. The second chapter defines the term objective and summarizes the most important investigations of curriculum objectives in each of the common school subjects. The third chapter indicates how learning studies may be used in curriculum making and summarizes the studies that are immediately useful in deciding certain preferred ways of directing the learning activities of the several subjects. The fourth chapter classifies and summarizes the research studies to determine, first, the time to be allotted to the various subjects in each grade, and second, the grade to which a given unit of work should be assigned. The fifth chapter summarizes the fundamental research in the field of measurement of ability and achievement as related to curriculum making, summarizes the important studies in adapting instruction to individuals, and reviews the attempts to measure the results of school work. The sixth chapter classifies and summarizes the recent studies made to evaluate courses of study and textbooks. The seventh chapter reviews those programs of curriculum revision in public schools which have been systematically and somewhat objectively prepared, and summarizes the more important experiments in curriculum revision in the private laboratory schools.

In preparing this review, the committee met once to determine the scope and main divisions of the field and to decide on the distribution of labor. From this point on, the business of the committee was conducted by correspondence, with occasional conferences between individual members and the chairman. The chairman of the committee compiled bibliographies in the several divisions by a special canvas of curriculum specialists and by the use of his cumulative card catalog. These were sent to the contributors as suggestions of the ground to be covered. The several chapters were edited by the chairman for coherence of treatment and bibliographical uniformity.

CHAPTER I

Curriculum Making: General

Bobbitt (3)[1] wrote the first modern general work on the curriculum. He pointed out the necessity for principles of curriculum making, suggested a number, and indicated their application to various subjects. Bonser (7) presented a more detailed analysis of principles, described in detail projects and content in the different subjects for each grade and suggested a method of organizing school systems for curriculum study. Bobbitt (4) gave an account of his work in Los Angeles, 1921-22, stating the form of local organization and the technics employed in setting up objectives for each secondary school subject. Later (5) he presented a more detailed statement and analysis of his general technics. Neither of these books covers the range of topics presented in his earlier work and both are inferior to Bonser on that item.

Charters (9) gave a very comprehensive discussion of the ideals and methods of activity analysis, but placed only slight emphasis upon the selection, organization, and grade placement of materials. He included a summary of selected studies classified under subjects, a new and valuable contribution. Rugg, (24 and 25) as chairman of a committee of the National Society for the Study of Education, presented two volumes, one on the history of curriculum making and the other on the agreements and disagreements of committee members upon theoretical issues, irrespective of their practical application.

All books written up to 1928 were too long on theory and too short on its application in practice. Harap (13) made the first real attempt to bridge this gap. He combines theory and practice into a series of steps to be followed by the curriculum maker in relating educational aims to the construction of units of instruction. The most comprehensive general treatment is found in Hopkins (14) who presents underlying curriculum principles, and a detailed plan for utilizing them in practice.

During the past decade, curriculum making in city school systems began in 1921 in Los Angeles (4). The real impetus to the movement was given in Denver in 1922-1925 (26) and was followed up by St. Louis in 1925-1926 (29). The Department of Superintendence lent its support through the yearbooks of the Commission on the Curriculum (19, 20, 21, 22, 23). At the present time curriculum revision is regarded as an important phase of city school administration.

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[1] Numbers in parentheses refer to the bibliography which begins on page 50.

State programs began in 1922 in Connecticut with the revision of the common school courses (24). Missouri had a state high-school program in 1925 (24). Indiana had a state-wide program in 1927, as did South Dakota in 1928. Idaho and South Carolina have state programs under way. During this period the two most important state programs are the California Curriculum Study of Bagley and Kyte (2) and the Alabama State Program (8).

During the past decade there have been attempts at curriculum making by national committees. These have been of two types: individual subjects, and general procedures. Of the former the most outstanding have been The Classical Investigation (1), Report of the National Committee on Mathematics Requirements (18), and the Modern Foreign Language Study, reports of which are now being issued (11). A general statement of principles together with practices in city school programs is contained in the *Twenty-Sixth Yearbook* (24 and 25).

During this period contributions to curriculum making have also been made by laboratory schools connected with institutions of higher learning. Of these the most important have been the University Elementary School at Missouri (17), the University School at the State University of Iowa (15), and the Lincoln School of Teachers College (16).

Procedures of Curriculum Making

During the past decade various writers (5, 9, 13, 14, 18, 19) have contributed to the isolation of steps in the procedure of curriculum making, resulting in the definition of a number of important divisions. The first step is to organize the school system for curriculum construction, which includes the setting up of machinery, selecting the personnel, and defining the purposes of the program. The second step is to set up aims of education in general, of the divisions of the school system, and of the various subjects. The third step is the selection of content, the material with which educational experience is broadened and deepened. The fourth step is to define the methods of teaching and learning, the common sources of which are psychological theory, experimental research, and classroom experience.

The fifth step in the process is to organize the content for teaching purposes, which may be based upon subjects, activities, units of work, units of instruction, contracts, or projects. The sixth step is to select outcomes. The various lines in which pupils are expected to make growth are detailed. Stress on outcomes is connected more with the activity project and unit than with the conventional subject organization. The seventh step is to measure the results in terms of the growth in the type of outcomes which are expected. The eighth step is to experiment with the course of study in a few classrooms and to revise it in the light of experience. The ninth step is the installation of the completed product in the school system. This step

involves the discussion of its use with teachers, defining classroom procedures, making of tests, and the giving of general and specific supervisory aids. The tenth and last step is to make provision for the constant and continuous revision of courses of study as new educational needs become manifest.

The Principles of Curriculum Making

Several important treatises (6, 14, 25, 28, 30) are concerned with the principles of curriculum making. In this summary only a few of the most important will be stated.

The actual work of curriculum construction and installation should be performed by teachers and other members of the educational corps within the school system. The leadership in a curriculum program should be assumed by a personnel trained in the general principles and practices of curriculum construction. There should be some conscious social philosophy underlying the whole program although the nature and utilization of such philosophy are still an open question. The school curriculum should prepare the child for effective participation in his immediate life and also direct his growth toward goals derived from the best conceivable standards of adult life. Content of subject matter is not an end in itself, but is a means of changing ways of behaving or responding.

The needs and demands of a rapidly changing social life necessitate greater emphasis than is common upon insights, meanings, concepts, and interpretations and less upon fixed patterns of behavior as represented by habits and skills. The school curriculum should be organized so as to promote the most effective learning procedures even though it means the abandonment of present school subjects. The school curriculum should be planned in advance to the extent that the teacher is given some well defined guides to his work. The problems and issues of contemporary life should play a much greater part in the school curriculum than at present. The curriculum should make provision for adaptation to the growth needs of individual children.

The Organization of the Personnel for Curriculum Making

Cocking (10) reports the practices in twelve progressive cities in organizing a personnel for curriculum making. Besides, the organization is outlined in reports of practical programs of curriculum making (12, 21, 27, 29).

The following are the most common steps in organization. First, a responsible head, usually called the curriculum director, has entire charge of the whole program. He works under the direction of the superintendent of schools or the commissioner of education. Second, a general advisory committee aids in determining the aims and objectives, guiding principles, the program of studies, and the general administratve set-up. Third, committees

composed primarily of teachers actually produce courses of study in designated fields under the direction of the curriculum director, and such other people as he may designate. The area of responsibility is determined by the school system. This assignment may vary from the construction of a unit of work for part of a year to the making of courses of study for the entire subject throughout the school system.

Fourth, a committee usually accepts responsibility for experimentation and try-out of courses of study during or after the process of construction. This experimental committee is usually composed of principals, supervisors, and members of the research staff. Fifth, provision is sometimes made for a reviewing committee to pass upon the completed product before it is accepted by the curriculum director and presented to the superintendent. Sixth, a committee usually accepts responsibility for installing courses of study. This group is composed of principals, supervisors, directors, and classroom teachers. Sometimes one committee serves for the installation of all courses of study, and often there is a separate committee for each. Seventh, a program of continuous revision is accepted and provision is made for rotating committee members to promote in-service training of teachers and more effective course of study production.

CHAPTER II

Investigations of Objectives of the Curriculum

THE purpose of this chapter is, first, to analyze the meaning of the term *objective* as used by leading writers in this field, and second, to point out technics and results obtained in recent major curriculum investigations. Curriculum workers have defined the term objective in various ways. Harap says:

> An educational objective is a specific goal, useful in life, to be achieved by education. It is the usable achievement which should be the result from any one unit of school work. It is what the pupil should be able to do, to know, or to be as a result of a given amount of learning. It is a specific usable skill, knowledge, or attitude which should be developed by school activity. It is a specific useful purpose of educational activity. (64:27.)

The assumptions underlying Harap's definition of *objective* are specificity, utility, and unity.

Bobbitt's earlier writings made extensive use of the term *objective* but at present we find the term *activity* substituted for it. He has recently written as follows:

> The all-inclusive objective of education is to hold high at all times and ages the quality of human living. . . . The current activities of high-grade living twenty-four hours each day, and seven days each week are the curriculum. (36:42-43.)

> . . . The objectives of education are all the activities which ought to make up the totality of human life from birth to death. . . . The objectives and the pupil activities are identical, and the series *is* the curriculum. (36.)

Charters emphasizes the fact that the objectives of education should be secured by "a study of the life of man in its social setting" and that objectives should be analyzed into ideals and activities. He would make a careful analysis of these activities and ideals in order to determine which ones should be learned in and which outside of school. There is apparently no difference between the technics of Bobbitt and Charters except that the latter makes a distinction between ideals and activities, which is primarily a method for giving generalized training in ideals. Like Bobbitt and Harap, Charters emphasizes the requirement that the working units used to attain the objectives should fit the mental stride of the learner and that objectives are attained by mastering a series of minor steps.

The degree to which these specific objectives or activities can be discovered depends, first, upon the nature of the material under investigation,

and second, upon the availability of satisfactory technics for analysis and synthesis. The nature of these technics has been commented upon elsewhere in this study and will not be repeated here. A resumé of the major curriculum investigations from 1928 to the present follows.

Extra-Curriculum Activities

Rugg (98) critically evaluates present practices in this field and offers data on extra-curriculum activities from eighteen master's theses written under his direction. These data relate to (1) social education of teachers; (2) duties of a high-school dean; (3) student participation in school government, physical education, clubs, assemblies; (4) Boy Scouts, Camp Fire Girls, and Hi-Y organizations; and (5) out-of-school activities of pupils. Sharp (103) made an investigation of more than 100 summer camps to determine their defects. He presents a series of principles which he has formulated to be utilized in making and judging camp programs. Van Wagenen (111) made a study of the extra-curriculum activities in the colleges of the United Lutheran Church in America. A series of recommendations are made for the future guidance of these activities.

Art and Music

Relatively little has been done in this field. Whitford and others (114) present the consensus of a committee concerning social, vocational, and leisure time objectives of art. Good (57) analyzed state and city secondary courses of study in art, finding that without exception art is a variable or an elective in the senior high-school curriculum. Bird (32) concludes from experimental studies of children's drawings that a new approach to the teaching of this subject is desirable, stressing observation and communication, rather than imitation.

Only two studies were reported in the field of music. Harap (63) made an analysis of the musical terms contained in 201 programs collected over a period of ten years by one person. Gordon (58), chairman, presented the tentative report of the sub-committee on music of the North Central Association. Six courses in music are considered from the point of view of the general objectives for high-school subjects as recommended by the Committee on Curricula for the North Central Association.

Health and Physical Education

Two studies in this field made direct use of statistical data on health defects. Rogers (94) compared the health defects of school children with the defects of men as found in the draft statistics. Cairns (41) utilized morbidity and mortality statistics and health records of pupils as a basis for curriculum objectives. Chase (44) studied the out-of-school activities of elementary school pupils by means of pupil diary and pupil questionnaire. She found that the recreational side of the physical education work

of the school was not influencing these out-of-school activities to any appreciable extent.

La Porte (74) had 125 college directors of athletics evaluate 30 major physical activities now commonly taught in schools evaluated on these bases: Contributions to (a) physical and organic good, (b) citizenship, (c) physical development, (d) development of safety skills, (e) training of leisure time activities. Median ranks for each activity are then presented. McCurdy (78) presents the report of a committee which studied the curriculum of the 139 institutions preparing teachers of physical education in the United States in 1929. Oberteuffer (85) utilized the health questions asked by 2400 men students in hygiene classes as a basis for curriculum objectives in that field. The questions are presented in the study and are organized into general topics and divisions. Chappelear (42) analyzed twenty natural science textbooks, forty courses of study, the College Entrance examination questions, and the New York State Regents Examination questions in biology, chemistry, and physics, for the years 1916-1926, and other teaching material in order to determine the health content contained therein.

Reading

The objectives in the field of reading were analyzed by Zirbes (116) through the technics of expert evaluation of reading material and experimentation in the effectiveness of supervisory programs. This analysis resulted in a collection of desirable and undesirable activities in the field of reading.

A number of studies appear in which the authors investigated the reading interests of children and adults. Eckert (53) studied children's choice of poems in grades one, two, and three, and reports that the conventional type of children's poetry, usually found in even the better series of school readers, is not enjoyed by the children themselves as well as other poems which may be found in the better anthologies of child verse. Elder and Carpenter (54) found in their questionnaire study of approximately 500 high-school girls that fiction was read and liked better than anything else. Jennings (66) secured a diary record of the out-of-school reading of 880 children in two junior high schools. Tables are presented showing the newspaper articles best liked, magazines read most frequently, nature of magazine articles read most frequently, and favorite magazines and books. Lancaster (73) made a questionnaire study of pupils in grades four to eight to determine the books that they had read voluntarily. His major conclusion is that children's tastes in literature may be satisfied by reputable authors.

Gray and Munroe (60) evaluated previous studies that had been made in regard to the reading interests and habits of adults. They also present case study data collected through interviews by one of the authors. Grace (59) studied the reading interests of 3288 adults by means of a questionnaire. Tables are presented which show the adult's interest in books, sub-

jects, magazines, and the various divisions of a newspaper. Farnsworth (55) studied the reading habits of adults in the state of Utah by means of a questionnaire brought home to parents by school children. These general conclusions were reached: (1) The book reading was meager and in general of poor quality, (2) little evidence of choice or thought was shown in the selection of reading materials, (3) the various districts studied read about the same materials, (4) women read more than men, and (5) school achievement was the most potent factor affecting the amount and kind of reading.

Experimental preparation of suitable social science materials for fourth-grade pupils was studied by Kyte (71). Reading interests were discovered through pupil reactions to the selections submitted to them. The difficulty of the selections was determined by means of comprehension tests on selected samples. The children also indicated on the mimeographed manuscript those words which they did not understand.

Language

The errors made by pupils formed the basis for all curriculum studies reported in this field. The Department of Curriculum Study of the Pittsburgh Public Schools (91) reported the success with its minimal essentials course in English composition. Matravers (77) secured by stenographic reports 107,000 running words of high-school pupils' conversation. The opportunities for making an error were then computed on a per 10,000 running word basis. For example, the index for "aint" and the corresponding forms of the verb "to be" was 30.7, for one form of the double negatives 16.5, and for the past perfect form of the verb "write" the index was only 1. On the computed basis, therefore, there are 30 times as many opportunities for making an error with a form of the verb "to be" as there are with an incorrect form of the past perfect of the verb "to write." No evidence was presented relative to the reliability of the sampling. Symonds and Lee (109) analyzed compositions to discover the frequency of correct and incorrect punctuation and capitalization. The authors state that the data can be utilized by concentrating in each grade on those punctuation errors most frequently found. Harap (61) combined all data concerning grammatical errors which had been discovered in the thirty-three investigations already made in this field. The list is organized logically on the basis of errors in verbs, pronouns, adjectives and adverbs, prepositions and conjunctions, nouns, sentence structure, punctuation, and capitalization.

Foreign Language

Word studies were the major contribution to the curriculum in the field of foreign language. There were two major studies of the frequency of occurrence of words. Vander Beke (112), with the assistance of others, made a frequency study of 1,147,748 running words of French reading

material. He also utilized the data secured by Henmon in his study of 400,000 running words of similar reading material. Tables are presented showing the range and frequency of occurrence of each word. Morgan (81) utilized the data of Kaeding's *Haüfigkeitswörterbuch der deutschen Sprache* in a frequency study for German words. The basic words are then given in the order of frequency and in alphabetical order. Curriculum making by committees is exemplified in a report by Ryan (100), Chairman of the Sub-Committee on first year Spanish and first year German appointed by the North Central Association on Unit Courses and Curriculum. It represents an attempt to apply to these subjects the basic general objectives adopted by the Association.

Mathematics

Several investigators analyzed textbooks in order to discover the objectives of mathematics. Congdon (45) determined the mathematical vocabulary, symbolic facts, concepts, scales, general principles, and methods in a textbook in college physics, and outlined the mathematical training necessary to pursue successfully such a physics course. Haviland (65) made an analysis of high-school chemistry textbooks to discover the mathematical material which they contained. Kilzer (69) found the mathematics necessary to work the problems in the five most frequently used physics textbooks and laboratory manuals in Iowa high schools. These data were incorporated into a test by means of which the relative difficulty of these items was later discovered. Remmers and Grant (93) investigated the vocabulary of twelve algebra and geometry books on a sampling basis and then noted the number of different words per thousand and the number not appearing in Thorndike's *Teacher's Word Book*. Comparisons are then made between the different books on the bases noted. The drawing of inferences from data of this sort must be done with great care. It involves certain assumptions relative to the reliability of word lists in the *Teacher's Word Book* and the similarity of context and conditions under which the difficult words are presented from text to text that may prove invalid when subjected to careful investigation.

Studies were made of the social utility of arithmetic by two investigators. By means of questionnaire, Bowden (37) secured information from adults concerning the kinds of arithmetic problems which they solved outside of their vocation. He concluded that more than 85 percent of the arithmetic, which is now taught in schools dealing with certain life situations which he names, is unnecessary. The major assumptions upon which the validity of this conclusion rests are these: (1) That all types of arithmetic performed by adults are equally well remembered; (2) that adults are clearly aware of all types of arithmetic work which they perform including those problems which they do "in their head"; and (3) that what adults are now doing represents desirable practice.

Dale (49) formulated a master list of all common business words in the English language and investigated the frequency of occurrence of these terms in a sampling of 310,000 running words of investment material written by experts for the lay reader. A comparison of the words occurring with high frequency in these materials with those found common to four commonly used arithmetic textbooks indicates that the latter fail to emphasize sufficiently certain words appearing with high frequency in investment materials. Further, words appearing rarely or not at all in investment materials appear commonly in the textbooks. The suggestion is made that frequency of appearance in investment materials be one of the criteria utilized in the selection of the technical, business vocabulary taught in the field of arithmetic.

Powell (92) collected 3000 elementary algebra problems from graduate students, eliminated duplicates, divided them into groups of 150 each, and then asked 500 experienced and trained teachers of algebra to evaluate them on the bases of genuineness, importance, interest, and difficulty. High-school pupils later evaluated the same problems, and it was discovered that they showed little concern in problems rated by the teachers as highly interesting. Brudos (38) determined present practices in junior high-school mathematics by analyzing courses of study in that subject. The number abilities of children when they enter Grade I were studied by Buckingham and MacLatchy (39) by means of a teacher-interview technic. The interview dealt with counting, number concepts, and number combinations and was given to 1356 children in twelve localities. Their data indicate that young children use numbers and possess number ideas to an extent that has not usually been recognized. For example, nearly 50 percent of the children interviewed already knew half the combinations.

Social Studies

Textbooks have been analyzed in various ways to secure curriculum objectives in the field of social studies. Two studies were made of vocabulary. Barr and Gifford (31) discovered those words which appeared most frequently in eight different high-school texts in history. The 3000 words of highest frequency in Thorndike's *Teacher's Word Book* were excluded from the study. The result of the study is a list of the 1900 words which occurred in 75 percent of the books. Cutting off the first 3000 words offered a unique method of meeting the problem of deciding what shall be considered a technical term in history. Its shortcoming lies in the fact that it left undetermined the frequency of occurrence of such words as *absolute, authority, balance, citizen, commerce, congress, council, district, exchange, govern, manufacture, province, subject, territory,* and many other technical terms which occur among the 3000 words eliminated. Stephenson (107) made an analysis of the technical vocabulary found in ten civics textbooks. He suggests that familiarity with the words that appear frequently in these books is necessary if pupils are to read them with under-

standing. It appears, therefore, that before such a word list becomes of high value to teachers or curriculum makers, studies must be made of the difficulty of the terms to discover which ones are so unfamiliar to pupils as to necessitate special study. Textbooks and treatises in this field were studied by Billings (34) and Lee (75). Billings presents 808 basic generalizations and 125 central themes which occurred in the works of frontier thinkers in the field of social studies. Lee analyzed, compared, and evaluated the social issues found in fifteen textbooks in civics and twenty-two treatises by authorities in various technical social fields.

Mahan (76) attempted to determine the chief duties, difficulties, and traits involved in good citizenship and the extent to which the schools are now giving the necessary training in this area. The data were secured by questionnaire from 350 junior and senior high-school pupils and by interview from 80 representative citizens in one city. Further, replies to a questionnaire were received from 350 representative citizens from typical American communities through the United States. The generality of certain of the activities, e.g., "render civic service," "be well informed," "obey laws," makes them of slight value to the curriculum maker. The same objection can be offered to the list of desirable traits that is offered. It would be difficult to set up learning units for traits expressed in such general terms as loyalty, thrift, and tolerance. From 500 mature students, Peters (89) secured lists of citizenship activities performed by themselves, by good citizens, and by bad citizens. All these separate lists were translated into comparable terms and utilized as data in forming a blue print of a perfect citizen. Rugg (97) compiled and evaluated the major curriculum studies in the field of social studies. His major conclusions are as follows: (1) the proportion of content socially valuable in terms of frequent, universal, or crucial use is relatively small compared to the sum total of human knowledge in that field; (2) the judgment of specialists in the study of society is the best single source of the persistent and insistent problems to be studied in the social science curriculum; (3) the major hypothesis for the determination of minimal essential facts lies in an analysis of the allusions or references to facts in critical magazines and newspapers; (4) only by complete, detailed inventories of the activities of citizens will one probably obtain with any certainty and finality the particularized objectives that are crucial to a complete curriculum; and (5) the present curriculum is seriously deficient in providing effectively for both social and learning needs of secondary pupils.

Teacher Training

Studies which illustrate the preparation of content courses for teachers or superintendents in training are those by Billig (33), Schaaf (102), and Rubado (96). Billig (33) illustrates her technic for the selection of content for science courses by taking one scientific principle and then select-

ing those elements which are directly related to the principle and without which its adequate understanding could not be obtained. Schaaf (102) shows how a course for prospective teachers of junior high-school mathematics is derived by the use of six professionalizing elements; namely, teachers' knowledge, appreciation background, educational values, teaching objectives, psychological considerations, and teaching procedure. The content of each unit of subjectmatter was selected to satisfy each of these six elements. Rubado (96) by means of interview and questionnaire secured from 54 city superintendents of schools the problems which they had actually met in their work as administrators. Next a checking list was presented to each superintendent and he was asked whether training on certain phases of arithmetic was essential, useful, or of no value to him as a superintendent of schools. The investigator presents and interprets the data secured in this fashion.

The purpose of a study by Charters and Waples (43) was (1) the discovery of the traits of good teachers, (2) the discovery of the activities of teachers, (3) the evaluation of teachers' activities, and (4) the application of these data to the reconstruction of teacher-training curriculums. The traits were discovered by interviewing ninety-seven parents, teachers, pupils, supervisors, superintendents, and professors of education. The activities were secured through questionnaires to teachers and from previous studies. The next step was to have various groups of persons engaged in educational work evaluate the activities on the basis of frequency of occurrence, relative importance, relative difficulty and value of pre-service training. Illustrations are then offered of the value of these data for construction of courses in various educational fields. Tyler (110) utilized data from the preceding investigation and discovered that the rating for importance by teachers correlated with that of educational philosophers to the extent of .764. He suggests that activities on which there is the greatest disagreement will be excellent raw material for a course in the philosophy of education.

The method of difficulty analysis was utilized by two investigators. Sperle (105) presents a collection of difficulties experienced by first year students in teacher-training institutions as secured from a questionnaire addressed to faculties and students. Sprague (106) made a collection and classification of case problems for which student teachers desired solutions.

Morris (82) made an attempt to measure probable success in teaching by a test which includes opportunities for expressing degrees of liking or disliking, for reacting tactfully or not, for interpreting situations both in terms of judgment and in terms of feeling. The studies emphasize the necessity of including training in certain traits in the curricula of teachers colleges.

A study by Peik (87) includes (1) an analysis of the content of prescribed courses in education at the University of Minnesota, (2) a study

of the emphasis accorded each topic by the instructors of these courses, (3) a canvass of teacher judgments regarding the professional value of the prescribed courses taken by them at the University of Minnesota, and (4) an analysis and evaluation of the data in form for faculty use. These are indispensable data for those interested in reorganizing curricula of colleges of education. The inadequacies of the technics used were fully recognized by the investigator and safeguards set up.

Rugg (99) analyzed five general "introductory" textbooks in education and a sampling of eleven educational periodicals in order to discover those educational terms or concepts most frequently mentioned. He found 2109 different concepts, including derivatives the first 101 of which represented over half the total. He concludes that teachers must be familiar with the frequently appearing terms in order to read educational journals intelligently. McGuffey (79) utilized data from the check list of the *Commonwealth Teacher Training Study* to discover differences in the activities of teachers in rural one-teacher schools and of grade teachers in cities. He found a real and statistically reliable difference between the activities and attitudes of these two groups.

Warner (113) utilized five methods for securing teacher-training objectives in the field of industrial arts, namely, (1) a study of trends through the use of historical technics, (2) a study of comparable institutions in Ohio and elsewhere using comparative technics, (3) a study of the reactions of competent specialists regarding industrial arts objectives using the technic of jury action, (4) a study of the recommendations of 480 experienced teachers concerning the preparation of other industrial arts teachers using a field study technic, and (5) an interpretative analysis of the views of leaders concerning the preparation of industrial arts teachers by means of bibliographical and philosophical technics.

Science

Complete statements of objectives in general science were found in two investigations. Curtis (48) compiled and evaluated groups of syllabi, the results of textbook analyses, studies of the scientific interests of children, and magazine or newspaper analyses, eighteen in all. The findings are presented in tabular form as a series of topics, each having a numerical evaluation. Harap and Persing (62) analyzed curriculum investigations, courses of study, and textbooks in the field. The sources had been previously evaluated by a group of thirteen leaders in general science. The objectives secured through the analysis of these materials were then grouped under main headings and tabulated for frequency.

Overn, Iler, and Heinemann (86) analyzed a total of 45 textbooks in order to secure the topics and principles treated therein. Their data were summarized and interpreted by Downing. Burkhart (40) analyzed 114

articles in the "Science of Invention" section of the *Literary Digest* and eight books on science of a popular or semi-popular nature for their concepts. One thousand five hundred and seventeen different concepts were discovered.

Merrill (80) analyzed 10,000 pages of scientific material written for the layman and noted the groups or specific plants discussed and the activities or relation being considered in connection with them. When these data were compared with the similar analysis of botanical textbooks, the following diversity of treatment was discovered. The textbook writers devoted 21 percent of their space to a discussion of the lower forms of plant life, including bacteria, minimized the food-producing groups of plants by devoting 4 percent of their space to them, and used 6 percent of their space in the discussion of the economic phases of plant life. The writers of periodical literature, however, devote 4 percent of their space to the lower forms of plant life, 29 percent to food producing groups of plants, and 44 percent to the economic phases of plant life. If we accept the assumption of the investigator that the emphasis in botany courses should parallel the emphasis in periodical literature, then botany textbooks unless properly supplemented are grossly inadequate. However, it seems plausible to assume that since certain phases of botany will be amply covered in periodical literature, the textbook should be devoted to the less known and perhaps more difficult phases of the subject. Both assumptions need careful scrutiny. The investigator believed that the wide discrepancy pointed to a real deficiency in high-school textbooks in botany.

Peters and Himes (90) present data from questionnaires to 90 high-school pupils, in which they were asked to indicate on a check list those items in biology from which they received the greatest pleasure and also the frequency with which these materials were used after the study of biology had been completed. It is important to point out that in this and other studies dealing with the use to which some fact or skill is put, it is usually assumed that all types of uses are equally well remembered. If important uses are not as readily recalled as certain unimportant uses, much of the data are rendered invalid. Johnson (67) made an analysis of the elementary and sequent courses in the College of Agriculture, Forestry, and Home Economics of the University of Minnesota, the purpose of which was to appraise and evaluate the botanical knowledge gained by the students taking these courses.

Persing (88) offers the objectives found in three curriculum investigations in the field of chemistry, six courses of study, and six textbooks. These sources had been previously evaluated by a group of 24 judges, chiefly chemistry teachers. Specific objectives in physics were secured by Muthersbaugh (83), who used textbooks, courses of study, and curriculum investigations as his source material.

Industrial Arts and Vocational Education

The purpose of a study by Smith (104) was to determine the additional training needed by the employed worker. Objectives were secured from leaders in the fields of labor, industry, and education by means of a group conference method. The objectives were then divided by a committee into six categories and the appropriate subject matter was subjectively derived. Newkirk and Stoddard (84) utilized a questionnaire to study the kinds of jobs included in courses in home mechanics in 75 schools. A questionnaire filled out by pupils indicated that there were 72 outstanding jobs in home mechanics. King (70) investigated the actual work in which Denver boys between the ages of 16 and 23 were engaged. The data were secured by interviewing the executives of 161 firms.

Commercial Education

Adult opinion of desirable curriculum material was the basis of a study by Sublette (108), Ross (95), Dick (50), and Frutchey (56), who carried on a co-operative investigation to determine the basic business information and skills needed by everyone. A master list of such information and skills was secured from representative business men throughout the United States and later evaluated by them. That the common essentials of business are best determined through securing the opinions of business men is an assumption of doubtful validity. It also appears from an examination of the data that better results might be obtained in further studies of this type if vocational and non-vocational essentials are investigated separately.

Activity analysis was utilized to secure curriculum material in two studies. Connor and Jones (46) analyzed the duties performed by clerical workers in Cleveland, exclusive of stenography and bookkeeping. This list of duties was combined with lists formulated by other research workers and the office managers' and clerks' activities were evaluated for frequency of performance, importance, difficulty, and need for formal school training. Final evaluated lists are presented in tabular form. A modified form of this technic was utilized by Salisch (101), who analyzed the waitress trade into habits and skills, direct and indirect knowledge units, and attitudes and appreciations necessary for carrying on the work efficiently. She presents arguments for training in the public school for this vocation, preferably at evening schools. Young (115) traces the development of the commercial course in public high schools from their inception in colonial times down to the present, and presents typical curricula utilized today or recommended by national bodies.

Home Economics

Judy (68) discovered trends and needs in home management courses in college by means of a questionnaire. Further, the 126 topics reported by 68 instructors of courses in home management were evaluated by a jury

of ten experts in the field. Kugel (72) had parents evaluate 53 different topics which occur in home economics classes under the head of family relationships. The ratings show a close agreement in favor of the topics, with the exception of those referring to companionate marriage, study of divorce and desertion, prenatal life, and care of the newborn child. Cook (47) investigated the content of twenty-five books in the field of marketing, advertising, retailing, merchandising, and salesmanship to discover those generalizations which would aid the consumer in a better understanding of business methods. Dyer (51) furnishes data concerning present practices in the field of home economics and presents desired practices as indicated by the ratings of various groups of judges.

Conclusions

Analysis of the studies will probably prove fruitful in respect to subjects of investigation, sources and technics, and personnel. It should be noted that learning studies have been dealt with in Chapter III and are not here analyzed.

The data are too meager to point out significant trends. Nevertheless, the emphasis on studies of extra-curriculum activities and teacher training merits comment. The crop of teacher-training investigations indicates that educators are beginning to follow their advice to others, namely, to study the objectives of their curricula.

Less than ten studies were made in each of the other subjects studied, indicating that current curriculum research is fragmentary. Further, it is commonly carried out under the assumption that the present organization of the school into subjects should govern the study of objectives and their later organization into curricula. Convenient and traditional methods of school organization and teaching must not be allowed to dictate methods of research in curriculum objectives.

An analysis of the technics and sources used in these investigations indicates no well-defined trend in any direction. Pupil behavior is probably a more common source of raw material for objectives than it has been in the past. This statement is especially true in the field of reading and extra-curriculum activities. Seven studies utilized tests to determine children's familiarity with certain items of information. No adults were tested in this fashion. Textbooks, courses of study, and treatises were used as sources in eighteen studies. Not infrequently, however, objectives secured by other methods were compared with textbook and course of study objectives in order to discover deficiencies in the latter. Only one study used conversation as a source of raw material for objectives, a virgin field for curriculum research.

The greatest technical weakness of the studies here reported is their failure to state or recognize the assumptions underlying them. These assumptions relate to technics of investigation, sources, methods of teaching,

and the purpose of education. A straightforward statement of these major assumptions facilitates verification, when possible, by later investigators and forestalls unmerited criticism.

A discussion of the assumptions underlying the two technics most commonly utilized in these curriculum studies, namely, questionnaire and jury evaluation is in order here. The common assumptions relative to the questionnaire were: (1) That it is the most satisfactory technic to employ; (2) that the persons who are questioned have and will freely give the desired information; (3) that the tendencies toward error are compensating, not cumulative; and (4) that the sampling is adequate and reliable. Most of the studies reported contained one or more of these untested assumptions.

The studies of jury evaluation contained one or more of the following assumptions: (1) That the problem was one which could properly use data of this type; (2) that a valid technic was set up for selecting the experts; (3) that the number of experts used was sufficient to give reliable data; and (4) that the experts selected gave great care and thought to the problems submitted to them.

Historical technics, case-study technics, laboratory, and elaborate statistical technics were rarely used and then almost exclusively by trained research workers. The data secured in this fashion were usually validated with extreme care.

Approximately half of the studies were made by candidates for higher degrees. The value of such studies depends almost wholly upon the research skill of their advisers, hence they vary greatly in their quality. An almost completely new set of curriculum investigators is found from year to year, indicating that with several exceptions there is little tendency for workers in this field to do continuous research in a single area over a period of years. This lack of continuity and concentration in research is probably the greatest handicap to the successful reconstruction of the public school curriculum.

CHAPTER III

Nature of Learning Activities

CERTAIN data obtainable only from studies of learning are essential in any thorough-going program of curriculum construction. Investigations of curriculum objectives serve only to define the specific goals to be attained by education. The curriculum must also provide for the pupil activities by means of which the objectives may be reached. To determine the types of school experiences which enable pupils to attain the desired objectives is a necessary step before the units of work which the curriculum provides can be put into operation.

The necessity for such investigations of learning may, perhaps, best be shown by illustration. Consider the curriculum in handwriting. The determination of objectives sets certain goals in this field relative to legibility, fluency, and speed in forming the letters and words necessary in written expression. These are the objectives of the handwriting curriculum. But the curriculum should also indicate the types of experience by means of which pupils may acquire the desired proficiency in writing. At this point the importance of such studies of learning as those of Gates, Hertzberg, and Taylor in which evidence is obtained of the relative effectiveness of learning to write by copying models or by tracing letters should be apparent. These investigators found that copying from models was the more effective learning activity. This type of evidence is necessary in order to construct a curriculum which provides superior learning activities.

To distinguish between these studies of learning which are necessary to curriculum construction and those which are a part of a science of teaching method is difficult. The latter type of studies is to be summarized in a forthcoming issue of this *Review* and should not be duplicated here. Perhaps it is sufficient to make a rather arbitrary selection so as to include in this chapter the various types of investigations which appear to provide a basis for the selection of units of work for courses of study.

The Relation of the Learning Activities to the Life Situation

An examination of the better courses of study reveals the fact that curriculum makers have not generally recognized the importance to their work of investigations in learning. Many curricula are based on the assumption that the best learning situation is the one which most nearly duplicates the corresponding life situation. Yet relatively few scientific studies in recent years have been made to determine to what extent the effective

learning situation should reproduce the specific elements of the life situation.

Gates and Taylor (144) conducted an experiment with two equivalent groups of pre-school children to find out whether beginners learn to write script more effectively by first tracing letters on thin paper or by commencing at once to attempt to form letters free-hand by copying models. Tests revealed that the tracing group learned to trace, but that this skill did not transfer to making letters free-hand. With much less time devoted to practice the writing group made a score of 26.2 as contrasted with the score of 15.0 of the tracing group.

Hertzberg (148) elaborated and refined this experiment by comparing the groove-tracing method, the transparent paper tracing method, the free-hand copying method, and a combination of the three methods. The groups were equated with reference to mental test scores and scores on a new test of motor ability. The results again indicated that the tracing methods did not transfer to free-hand writing. The beginners made most progress by learning to write free-hand from the first.

Evidence in the field of foreign language was presented by Buswell (126). By comparing the eye movement records of students of Latin and French who had been taught by a direct method emphasizing reading with those who had been taught by the grammar translation method he found that the former group developed satisfactory reading habits while the grammar translation method produced habits indicative of deciphering and not of reading. Supporting these findings, Cole (129) reported an experiment with a limited number of students which indicated that students learned to write a foreign language more effectively when they were taught to write free compositions than when they translated English compositions into the foreign language.

In studying methods of learning the meaning of words Distad and Davis (140) found a superiority in sentence-dictation methods of practising spelling as contrasted with column-dictation methods. On the other hand, McKee (164) discovered that the column method was superior to the phrase method, the sentence method, or the paragraph method in learning to spell isolated words, and the column method was equivalent or superior to the context methods in learning to spell words in new contexts.

In the subject of biology, Laton (158) experimented with two equivalent groups. One group was given special instruction in the methods of preventing disease by discussing specific situations involving common diseases and their control. The other group was taught the general biological facts and principles which apply to the control of diseases. The group given specific training was found to excel in information about disease prevention.

The foregoing studies indicate an advantage in having the learning activities similar to the life situation with respect to the general purpose

of the activity, to the general type of mental or motor activity involved, or to the type of information utilized in learning. However, many courses of study have gone much farther than this by providing learning activities which reproduce the specific details of the life situation even at great expense of time and facilities. Is there any evidence to support this practice?

Knight and Setzafandt (155) selected two groups of pupils none of whom were able to add fractions at the beginning of the experiment. Group A was given practice material involving all of a certain list of denominators. Group B spent the same amount of time in drill but did not practise on numbers involving half of these denominators. Upon being tested in the addition of fractions and mixed numbers involving all of the denominators Group B did as well as Group A. The authors concluded that there was a high degree of transfer within this narrow mental function.

Somewhat similar conclusions were reached by Beito and Brueckner who utilized three 2B grades for their experiment in learning the addition combinations. The investigators stated:

> 1. When pupils of any mental level are taught only the direct form of an addition combination such as 7 as nearly as can be, the reverse form, 4 is learned concomitantly
>
> $\frac{4}{}$ $\frac{7}{}$
>
> at least as completely as the direct form.
>
> 2. The bond formed in learning the direct form of an addition combination carries over almost completely to the reverse form. The amount of carry over is influenced very little by the method of presentation. (121:587.)

Whether pupils obtain the correct solution to conventional problems in arithmetic as readily as to problems which give many specific details of the situation was investigated by Wheat (183). He found negligible differences in the pupils' responses to the two types. It did not appear that the problems which reproduced the life situation in specific detail were solved more readily. Washburne (181) reported similar results. Mitchell's study (167) indicated somewhat less generalization by pupils.

Woodrow (187) discovered that training in methods of attack may be transferred by the learner to new situations. Archer (118), Persing (172), and Simpson (178) reached somewhat similar conclusions, but they found the amount of the transfer of methods was variable.

Possibly the only generalization that can be drawn from all these studies is that it is desirable for the learning activities to reproduce the life situation up to a certain point; but to reproduce the life situation in specific detail is not only wasteful of time and facilities, but may hinder rather than facilitate the desired learning. Curriculum makers need much more objective evidence relative to the extent of reproduction most effective for each school subject.

The Extent of "Pupil-Purposing" in the Learning Situation

The importance of learning situations which pupils themselves have chosen and in which they engage whole heartedly has been staunchly maintained by Dewey, Kilpatrick, and others. For the curriculum maker this problem has two phases, one relating to objectives and one to learning. Few recent studies have been made to determine the relative value of "pupil-purposed" learning situations in attaining commonly accepted objectives of the school.

Earlier, Collings (130), Marks (162), Meister (165), Meriam (166), and Watkins (182) reported distinct success with learning activities based largely on interests and desires of the pupils. Recently, Cook (131) conducted an experiment with college freshmen in English. One section of the class proceeded on the usually accepted plan of definite assignments. The other section chose their own reading, made only voluntary reports, and were encouraged but not required to form special social groups for reading and reporting. During the term the voluntary group read 32.5 percent more literature than the required group. In an examination at the close the voluntary group agreed more closely with the instructor in judgments of the worth of various standard novels and current fiction. Unfortunately the author presents no evidence of the equivalence of the two groups, nor of the degree to which other values were obtained in the course.

Deputy (139) found that the measured value of written exercises administered to three sections of a course in philosophy varied with the attitude of the students toward written work. Those students who favored written work made higher scores when written work was provided. Which is cause and which effect is not shown.

In many of the investigations summarized in other sections, the pupil's purpose may be a variable factor which accounts for some of the results. However, there are undoubtedly few recent studies which give an adequate answer to the question of the extent to which the curriculum should contain only those learning activities which will be voluntarily chosen and whole-heartedly conducted by the pupils.

Learning Complex Processes

Current courses of study evidence no agreement as to the degree to which a complex process should be broken into several simpler operations. The result of recent investigations suggests that in the early stages of learning the complex process must be simplified. After a careful analytical study, Brownell (123) concluded that the extensive use of concrete objects in developing the concept of number is more effective than to embark at once upon complex arithmetical processes.

Koch (157) found that beginners in learning to play the piano by developing skill with first one hand then the other gained proficiency sooner than those who used both hands from the first. In arithmetic, John (152)

compared the effect of teaching only the long-division form of solution in place of teaching both forms. She stated:

> The pupils who were taught both forms of division made more and a greater variety of errors than did the pupils who were taught only the long-division form (152:692).

Pechstein (170) experimenting with memorizing by school children concluded that the more difficult the learning process the more essential it is to break the learning into simpler parts, and the lower the I. Q. the more necessary is this division of the learning activities.

On the other hand, Buckingham's report (124) of experiments in seven centers regarding the relative advantages of teaching addition and subtraction facts together or separately indicated the superiority of the together method. In the face of such scanty evidence the curriculum maker cannot determine with precision the extent to which complex processes must be broken into simpler learning activities.

Studies Applicable to Particular Types of Subjects

In mathematics, Myers and Myers (168) utilized 564 children divided into two equated groups to determine whether the simple number combinations are learned more easily by finding mistakes in a list of combinations or by saying the same combinations over and over. The latter group made a much greater gain in accuracy with less time in learning. As the result of a study conducted with only 31 children, Fowlkes (141) concluded that the use of printed materials was more effective in teaching the one hundred multiplication combinations than the usual oral presentation accompanied by inadequate printed materials.

Several experiments were concerned with problem solving. Two studies (128 and 169) reported that training pupils in specific methods of problem analysis proved advantageous. On the other hand, two much more carefully controlled experiments gave somewhat different results. Perry (171) compared the use by geometry pupils of an outline of reasoning in contrast with the usual method of teaching the solution of geometry exercises. She concluded that for average and slightly superior students the instruction in technic of reasoning was a means of decreasing student difficulties but for the very superior students it was positively detrimental. In similar fashion, Hanna (147) compared three methods of teaching problem solving in arithmetic. He found that the individual method, which permits the child to develop his own method of attack without definite direction, was superior to the conventional method of problem analysis and fully as effective as the dependencies method. Lutes (161) presented evidence that exercises in learning directed toward improving computational accuracy resulted in greater gain in ability to solve arithmetic problems than training in choosing operations or in choosing solutions. Stone (180)

reported favorable results in teaching problem solving in arithmetic by means of diagnostic tests and practice exercises.

In reading, two recent studies were concerned with learning activities involving phonics. In the Newark experiment (176) the results clearly indicated that the teaching of phonics does not function appreciably till the last of the first grade or the first of the second grade. Gates (143) concluded that instead of using either phonetic or non-phonetic methods exclusively that the intelligent procedure was to determine what phonetic activities are of value and when to use them. Steiner (179) found flash cards or prepared lantern slides valuable in increasing reading comprehension, while Burks and Stone (125) concluded that two other widely used types of reading exercises were valuable. Camp and Allen (127) reported a distinct improvement in oral reading obtained through the use of a variety of learning activities. In literature, Coryell (134) and Williams (185) in two controlled experiments presented additional evidence of the superiority of learning activities based on extensive reading as contrasted with intensive reading.

In language, Williams (184) reported an experiment in which the phonograph was used successfully with thirty members of a normal training class to improve pronunciation habits. A study by Bennett using no controls (122) indicated that a distinct gain on the Charters Language Test was obtained by a learning exercise in which fifth-grade pupils without discussion or specific direction spent a few minutes daily in correcting sentences. Leonard (159) with two equated groups, demonstrated the value of practice exercises in proof reading, correction of errors, and dictation exercises upon skill in capitalization and punctuation as measured by proof reading, correction of errors, and dictation tests.

In spelling, Woody (188) made a controlled study in which he discovered no appreciable difference in value between the test-and-study method and the traditional method of learning. Senour (175), who used no control group, found that pupils made decided improvement in spelling when taught by the test-study-test method. Guiler (146) reported an uncontrolled experiment with twenty-one pupils in which decided improvement resulted when a technic of teaching was used which discovered words difficult for the group and for individuals and identified for each pupil the difficult parts of troublesome words.

In foreign language, a study by House (149) with ninth-grade pupils indicated a distinct superiority in the method of teaching vocabulary by presenting pictures which were directly associated with foreign substantives. Action words were associated with the manipulations of the cards. Siebert (174) conducted an experiment in learning French vocabulary in which learning the words by pronouncing them aloud proved superior to studying them silently. Crider (135) found very little improvement in the successive translations of the same Spanish selections by a college

class. He concludes that intensive translation is not an advisable learning activity.

In the social studies, two investigations by Garnett (142) and Shaffer (177) found no significant differences in the comprehension and retention of material presented in factual form in contrast to the same material presented in dramatic episodes or in stories. The amount of retention and comprehension appeared to be primarily a factor of the number of repetitions of the material. On the other hand, McKee's study (163) with 600 high-school pupils indicated a decided advantage in the fact form of presentation. Conflicting results may be due to the different methods of testing comprehension and retention. If comprehension includes the ability to interpret and apply facts read, the ordinary tests do not measure comprehension adequately.

A comparison of oral and written presentation of the same materials has been made in two experiments. Russell (173) found that pupils learn more by having material read to them in Grade V, the two methods are practically equal in Grade VII, and the advantages are in favor of pupils' reading in Grade IX. With college students Greene (145) reported that individual reading was more effective than lectures for superior students, but slightly less effective for inferior students. In elementary science, earlier studies (133 and 150) indicated a superiority in the oral development method over written methods of presentation.

Three recent investigations present objective evidence of the value of visual materials in teaching. Wood and Freeman (186) conducted a most extensive controlled experiment in which they found a distinct superiority in the use of motion pictures over other visual aids. Knowlton and Tilton (156) also found motion pictures effective. Lewerenz (160) concluded that still pictures were of especial value to inferior students.

In natural science, the conflicting findings of studies comparing the effectiveness of the individual laboratory method with the demonstration experiment method (117, 120, 132, 137, 138, 151, 153, and 154) are probably due to the difficulties in controlling and defining the numerous variables. In most situations, however, experimenters have reported superior results with various types of demonstration methods of laboratory work.

A controlled experiment conducted by Curtis (138) revealed decided values in encouraging extensive reading of science materials both inside and outside of school. He also found that a definite attempt to teach pupils "scientific attitudes" resulted in a better showing on a specially devised test of scientific attitudes than is obtained by the usual method of teaching.

In an earlier study Ayer (119) had concluded that diagrammatic drawing was more effective for science work than representative drawing. Some of his conclusions, however, are open to question since they were based upon the fact of a slightly higher correlation between tests in diagrammatic drawing and description than between tests in representative drawing and

description. The amount of correlation is not a valid evidence of the effect of the drawing in improving the accuracy of description.

One is led to conclude, after summarizing these recent studies in learning, that there are available for the curriculum maker many specific facts applicable to the determination of the type of school experience by which the objectives of the curriculum may be reached, but that no series of principles has yet been evolved based on adequate experimental evidence. The co-operation of psychologists and curriculum specialists is needed to conduct an extensive program of appropriate experimentation which will permit the formulation of guiding principles for the selection of the learning activities of the curriculum.

CHAPTER IV

Time Allotment and Grade Placement

With one minor exception there are no objective studies to determine the time allotment for a given subject other than those based upon present practice. The present status of time allotment in any given school represents a rough approximation to an estimate of the relative importance of the subjects and possibly the relative amount of time it takes to master them. It should be borne in mind that the factor of time allotment is either absent or relatively unimportant when a school is organized under the Dalton Plan, certain other plans of individual instruction, and the most radical activity curricula. There is one point on which all studies of time allotment agree, namely, that the amount of time assigned to the formal subjects varies greatly in schools. The unanimously proposed remedy is experimentation and investigation.

Time Allotment

Holmes (203) made one of the earliest comprehensive studies of time allotment. Writing in 1915, he pointed out that the discrepancies in time allotment were due to the lack of evidence concerning the relative social values of the several subjects, their essential content, reasonable standards of accomplishment, and the amount of time needed to reach such standards. It is interesting to note that sixteen years have gone by and we have no scintilla of new objective evidence other than present practice which is immediately useful in determining time allotments.

Mann (209) studied time schedules, courses of study, annual reports, and other bulletins from 44 communities. The blank called for the time allotment on twenty-four subjects which was more detailed than that used in any previous study. He found extreme variation in the time given to any subject. The majority of cities exceeds the optimum time allotments established by experts in certain subjects. Cities of 100,000 or over show less variation in time allotment than any other population group. The percent of the total time assigned to the three R's has decreased from 91.7 percent in 1826 to 51.7 percent in 1926, although the actual number of hours has increased 300 percent in that period. Of the total, 11.8 percent is allotted to the content subjects and 36.5 percent to the special subjects.

Armentrout (189) made a study of time allotment in 33 elementary training schools of teachers colleges. The elementary training school spends more time than the elementary public school on hygiene, history, music, industrial arts, and supervised play. By means of questionnaires

Covert (197) ascertained present practice in apportioning time from eighty representative consolidated schools in 33 states. Spelling, penmanship, physical training, drawing and music receive about the same amount of time throughout the grades; language, arithmetic, physics, and geography receive constantly increasing amounts from the first to the ninth grade. Approximately 50 percent of the time is allotted to the three R's; a little less than 25 percent to the content subjects; and a little more than a quarter to the special subjects. The data were compared with those of forty-nine large cities and twenty-two Utah school districts, indicating that rural schools give a somewhat larger percent of time to content subjects and a somewhat smaller percent of time to special subjects.

Actual time allotments—In the survey of education of the State of Utah, the investigators for the United States Office of Education (218) determined from the daily programs the actual time devoted to the various subjects by selected teachers in twenty-two districts of the State. When compared with the median practice in forty-nine cities, the average pupil in Utah spends more time on spelling, history and civics, science, and hygiene; and less time on language, reading, arithmetic, geography, physical training, practical arts, and music. The three R's receive 50.6 percent of the time, the content subjects 19.3 percent, and the special subjects 30.1 percent. Bagley and Kyte (190) studied the programs of over 3000 teachers. Many programs consisted of periods too brief to permit of prolonged treatment of a complete unit of study. The three R's get the bulk of the available time and the content subjects the least allotment of time. By means of blanks, Brueckner (192) secured information concerning the amount of time given to each subject by the grade teachers of Minneapolis during a given week. Subjects like music, drawing, and writing show more uniformity than others because these subjects are closely supervised by specialists. By means of questionnaires returned by ninety-five cities and two counties in the State of Michigan, Woody (224) determined the time per week devoted to spelling. Approximately 7 percent of the total time was devoted to spelling.

An original study—In what appears to be the only original study in time allotment, Peters (212) marked out the units of work in geography and music lasting a week. Fifty-five teachers and students ranked sixteen units in geography and seventeen in music. Thus he finds that three units of geography rank first. A unit of music comes next before any more geography is chosen. With geography as a basis of comparison, complete index values might be worked out for all subjects. The study is significant because it attempts to solve the problem of time allotment more objectively than it has been done before. It should be noted that in this study the unit of comparison is considerably smaller than the half or year's work which is usually studied; and second, that the learning time on this unit is known before the comparison of relative importance is begun.

Grade Placement

The investigations summarized here are based on the following factors: (1) Present practice, (2) where a unit is most useful, (3) where it is most interesting, (4) where the pupil is best able to carry it out, and (5) a combination of two or more of these factors.

Studies of present practice—Dyer (200) recorded the placement and frequency of topics in 100 junior and senior high-school courses in home economics. Many of the topics were equally emphasized in all grades. Conrad and Hickok (196) assigned literary selections to the grade for which they were most frequently recommended in 44 courses of study published since 1920. The data include the grade range and the grade of highest frequency for each title. Pribble (213) studied five modern language textbooks to discover the grade placement of items concerned with correct usage. In the third grade there is agreement on two itms; in the fourth and fifth grades there is agreement on only one item; and in the sixth grade there is agreement on nine items. Washburne (220) secured data from 125 school systems in the middle west as to when different arithmetic topics were taught. The data, which are given in detail, show that addition is introduced for the first time in Grades I, II, and III. Kyte (207) analyzed a representative group of fifty-three elementary courses of study published since 1920 and listed the most common history materials for each grade. He concludes that there is large disagreement in grade placement due to the lack of objective data. Dyer (201) determined the placement of poems in the grades by analyzing 150 courses of study, twenty-six series of elementary school readers, and the recommendations contained in 201 books on the teaching of English. The study includes a list of poems for each grade, from Grade I to Grade VIII, each poem having been assigned to the grade for which it was frequently recommended. The investigator found thirty-six poems which had a range of six grades.

When learning a subject should begin—Data presented by Buckingham (194) and Washburne (220) favor beginning arithmetic in the first grade. The former designed an interview test consisting of counting, number concepts, and number combinations, which was given to 1356 children in about twelve localities. Since nearly 50 percent of six-year-olds already know half the combinations, they are ready for the learning of number in Grade I. Washburne (220) tested three equal groups of children who began arithmetic in Grades I, II, and III, the three making a total of about 2469 pupils. The test was given in the sixth grade and consisted of twelve parts covering all the fundamental processes. The pupils who began arithmetic in Grade I made better scores than the children who began the subject in Grade II, and the latter made better scores than the children who began arithmetic in Grade III.

Taylor (215) and Irwin (205) gathered data which favor beginning

arithmetic in Grade II or Grade III. Without attempting to equalize conditions, Taylor (215) finds, basing his conclusions on eight arithmetic tests, that two classes which began arithmetic in the second grade did a little better than two classes which began arithmetic in the first grade. Irwin (205) gave the Stanford Achievement Test at the end of Grade VI to two comparable groups of eighteen pupils. The first group was an experimental class which delayed formal learning of the three R's one and a half grades. The investigator found that the experimental group did as well in academic subjects, although they began one and a half years later and spent less than one-third as much time daily on these subjects as did the pupils who spent full time for six years.

Grade placement based on difficulty—The common determinant of grade placement is the difficulty of the topics in a subject. Many studies of this factor are in the field of language, wherein the difficulty of comprehension or errors in usage were studied. Kyte (207) studied the suitability of fifty-five selections of poetry and prose for inclusion in a third reader by means of a test made up of questions on representative passages. The text as a whole was given to 540 second, third, and fourth-grade children. The degree of difficulty was determined by computing the percent of correct answers. Of the original number, thirty-one were selected. Cutright, Halverson, and Brueckner (198) designed a vocabulary and comprehension test to discover the grade for which Spyre's *Heidi* was suitable and gave it to fourth, fifth, and sixth-grade pupils. The accuracy of comprehension for grades V and VI was found to be 60 percent. The authors conclude that fourth-grade reading ability will yield only 50 percent accuracy and eighth-grade ability is required to obtain a comprehension score of 85 percent.

Vogel and Washburne (219) developed a technic for determining the grade placement of a literary work. They examined 152 books for ten elements which might influence grade placement. Each element was expressed quantitatively and was correlated with the median reading score of the children who read the books. After a number of trials with various combinations the best multiple correlation with the reading score was obtained by combining (1) the number of different words occurring in a sampling of 1000 words, (2) the number of prepositions occurring in a sampling of 1000 words, (3) the number of words in a sampling of 1000 not found in Thorndike's *Word Book*, and (4) the number of simple sentences in seventy-five sample sentences. This combination formed the basis of a regression equation which gives the reading score necessary for the understanding of any given book.

Cavins (195) secured from experts criteria for the placement of poems, devised two tests of comprehension based on these criteria, gave them to over 3000 children, and set up a standard on the two tests to determine the grade placement of a poem. The average range in grade placement of

the poems occurring ten times or more was 3.43. The study includes a table showing in what grades sixty-four standard poems are actually taught in eighteen cities.

From five previous studies McPhee (211) selected thirty-nine language forms, converted them into test items, and gave them to 5026 pupils in grades II to V. The revised graded list of language forms is given and represents only a few changes from the original placement. Brown (191) constructed a graded list of language forms by testing the pupils in the eight grades of his school on twenty-eight common errors. In the first three grades, a form was assigned to a grade when more than 20 percent of the pupils erred in its use. For the other grades the lists were based on difficulty as shown by frequency of error. Symonds and Lee (214) analyzed 616 available compositions already rated on the Hillegas Composition Scale to discover punctuation usage, on the several grade levels as measured by quality. Errors of omission and usage were ranked according to frequency for Grades IV to XII. It is recommended that learning in each grade should be concentrated on those items which are most commonly mistaken in that grade.

Mathews (210) took seventy-two samples from Rugg's course of study and converted them into questions of the multiple choice and completion types. By means of this comprehension test, which was given to 9711 pupils in ninety-five cities, he determined the percent of pupils in each grade who understood the material represented by the sample, which was a guide to grade placement of the material. Reporting for the Committee of Seven of the Northern Illinois Conference on Supervision, Washburne (221) describes a study in grade placement of arithmetic topics which includes teaching on three grade levels, pretesting, final testing, and testing of retention. The results show when to begin to teach a process, and what prerequisite knowledge is necessary to learn a new process. The recommendations for the study of the topics are made in terms of mental age and arithmetic ability. In the field of science Webb (223) collected a large number of facts from textbooks and converted them into tests of knowledge and reasoning which he gave to 9819 pupils in eighteen states, in Grades V to VIII. The investigator recommends certain large blocks of science appropriate to these grades.

An interesting study made by Gesell and Thompson (202) with identical twins, forty-six weeks old, throws light on our problem. At the age of forty-six weeks, the first twin was given twenty minutes of training daily in stair climbing. At the fifty-second week the trained twin could climb while the other could not. At the fifty-third week, the untrained twin climbed without any instruction. At the end of the fifty-fourth week the twin who had received no training could do as well, if not slightly better than the twin who had had the training. Two weeks of training when the twin was ready for stair climbing was more effective than six

weeks of training before that period. This experiment seems to indicate that training in any given case is more effective when the individual is ready for it. Here readiness was a matter of physical growth. However, readiness may sometimes be a combination of physical capacity and interest.

Grade placement based on interest—The studies based upon the interests of children are limited to literature. Elsewhere the studies are reported in which interest was only one of the several factors considered. King (206) collected the preferred poems of 4800 children in ten cities for Grades I to VIII. Each poem was assigned to the grade in which it was most popular. Huber (204) prepared a list of poems from courses of study, expert opinion, and the judgment of 50,000 children. The poems were published in experimental booklets, one for each grade. Each booklet was used over a range of five grades. Each poem was assigned finally to the grade in which it was liked best. When compared with children's judgments, present practice is only 39 percent right.

Grade placement based on several factors—The determination of grade placement of learning units by a study of one factor such as difficulty, interest, or present practice, is not always the most satisfactory basis for grade placement. Of the four investigations which recognized the need of studying more than one basic factor three pertain to reading and include a consideration of interest as well as difficulty of comprehension of the literary selections. Uhl (217) collected lists of suggested literary selections from 2253 teachers from eighty cities in twenty-five states. These were submitted to 529 pupils in four schools, who were asked to indicate whether they liked or disliked them and why. The comprehension of the selections was measured by means of questions. The grade placement was based upon the interest and comprehension of 529 pupils and upon the teacher's judgment of these factors.

Washburne and Vogel (222) gathered ballots from 36,750 children in thirty-four cities giving their reactions to every book they read during the school year. Eight hundred books mentioned in 53,000 ballots were classified on the basis of the pupils' reading scores and translated into the grades to which the scores corresponded, yielding a graded list for Grades III to X. Competent children's librarians passed on the subject matter and literary quality, the approval of three-quarters being necessary for the final inclusion of a book. The data for each book given separately for boys and girls include: the number reporting on the book; the percent liking it; its interest value; the average age of those reporting; the average reading score of those reporting; the appropriate grade; the number of cities from which reports come; and an index of popularity. Terman and Lima (216) made a children's reading list by a study of the reading and interests of 2000 children. Data were also obtained from the home and school of the children; from children's bookstores; libraries; previous studies; and adult students. For each book an age range is given, but

the authors do not state the method of arriving at this range. Incidental to determining the basic reading for Grades IV, V, and VI, Bruner (193) ascertained the placement of the material in these grades. After the basic materials were determined for each grade, by ascertaining children's interests and adult judgments, they were tried out in the grade below and the grade above. The investigator does not state what the criteria for the placement were, hence we assume it was an informal selection based on interest and comprehension. Dolch's (199) selection of vocabularies for Grades II to VIII was based upon the use of words by pupils of these grades and upon grades assigned to them in other studies. Thinking and writing for fifteen minutes, 16,206 pupils in public schools in Illinois and New York, wrote a total of 12,622 different words. The vocabulary for any given grade was determined by comparing the data of the author's study with previous studies and experienced judgment.

Conclusions

An analysis of the procedures discussed above yield several conclusions. While the number of serious studies of grade placement on the basis of present practice is comparatively few, it is undoubtedly a common procedure in determining the grade in which a unit shall be learned. It is needless to say more than that this is an unsatisfactory basis of grade placement. The grade in which a subject shall begin to be learned is incidental to the problem of whole grade placement. However, three of the studies reported here compare the results of beginning a subject in three different grades. These do not represent a basic attack upon our problem but rather a check on existing variation in grade placement.

Difficulty of the processes involved in a unit is one of several fundamental factors which need to be considered in grade placement. The objective studies discussed here are chiefly concerned with difficulty of comprehension because it is comparatively simple to measure, and because the pupils already have the basic skill or knowledge with which to perform the functions which are being calibrated.

The experiment with infants made by Gesell and Thompson shows the intimate relation between capacity and the readiness to learn and the resulting waste when learning is premature. It is very likely that interest has the same effect as capacity, on accelerating learning thus establishing it as an important factor in assigning units of work to appropriate grades. The studies reported are limited to poetry, but similar studies in music, fine and industrial arts, science and the social studies would yield data useful in increasing learning efficiency.

The closeness of a unit of work to the time of its use in life should undoubtedly be an important factor in grade placement although there is no evidence that it has been systematically studied. This condition is probably due to the fact that much of the curriculum, as it is now constituted, is not applicable until after the years of formal schooling.

CHAPTER V

Measuring Ability and Achievement

THE materials of instruction are the invention of a few men of genius. In every age these men have created whatever they have needed to satisfy their own curiosity, craving for order, or love of beauty. These processes of invention began before recorded history and have continued to this day. Not only have they been continuous, but they have been cumulative as well. The bewildering number and variety of items in present day courses of study are the result of this cumulative process.

The growth of western civilization and culture in modern times has been due, in no small measure, to scholarship, research, and teaching. The eminent scholar has preserved ancient learning and the research worker has pushed forward the boundaries of knowledge. Both have taught, and the men and women who learned from them have taught in their turn. In this way the products of scholarship and research have been pushed down into schools for younger and younger pupils. Until quite recently curriculum construction for the lower schools has consisted largely of "pushing down," "organizing," and "packing in." This process has served the ends of civilization and culture well, but it must now give way to a more critical process. We now ask, for example, for analysis and description of the child's interests, abilities, and needs, and of the needs of society; and we insist that the answers shall be determined, as rapidly as possible, by evidence of the same objective character as that which has made science the dominant intellectual activity of modern life.

Today, many workers are engaged in selecting curriculum material in terms of its social usefulness and the capacity of pupils to master it. What the curriculum should be depends, in part, upon the nature, amount, and distribution of human capacity. It is justifiable, then, to call attention to the recent work of eminent psychologists and point out some of the implications of their findings for the curriculum worker.

Fundamental Research

Thorndike (249) assumes that intelligence and the capacity to learn are the same thing, and distinguishes three phases of this capacity. Investigations into the distribution of intelligence lead him to the conclusion that the distribution is best described by the familiar probability curve. Spearman (248) reaches the conclusion that the abilities of man may be divided into a G-factor and many S-factors. He believes the G-factor to be most prominent in the success of men in the professions and

the other more highly respected callings and guesses that it may be mental energy. On the other hand, he believes that many of the grossest failures among human beings possess one or more S-factors which, had they been developed, might have made a conspicuous success.

The perfection of the intelligence test and the skill of the technical user thereof has cast an unwarranted cloud of fatalism over the educational treatment of slow children, which is dispelled by a consideration of the findings of Freeman (231) and others reported in the *Twenty-Seventh Yearbook* of the National Society for the Study of Education. They discovered that I. Q.'s, school achievement, and conduct of children are degraded by a poor environment and improved by a good environment.

Lashley (236) working with white rats in the endeavor to trace the path of one or more complex mental processes through the cortex, much as the reflex arc has been traced through the spinal cord, found that the behavior of the nervous impulse in the cortex—perhaps in the whole organism—is much more general and dynamic than it would be if it were controlled by definite paths along nerves and through certain synapses. Lashley's findings, when considered as partial confirmation of *Gestalt Theorie*, affect present day theories of the nature of intelligence, especially as to learning and transfer. Instead of localizing learning in the synapses, the present tendency seems to be to emphasize the necessity for including the total adjustment of the organism to whole situations. The central factor in the adjustment seems to be an insight or a series of insights, accompanied by feeling states called attitudes. School learning becomes, then, the successive adjustment of the organism to repeated similar situations by a series of insights. As the adjustments improve with reference to an arbitrary standard, learning may be said to take place, and may be measured with reference to that standard. Most current studies to determine the nature and distribution of practice are based on the idea that learning occurs through changes in the resistance of the synapses. In consequence, many of these studies would seem to be misdirected.

Adapting Instruction to Individuals

The first two studies reported below might be included in the field of fundamental research. Baker (225) collects and evaluates out of sound training in psychology and wide experience in public school work the opinions of 500 Detroit teachers as to the nature of the differences in capacity of bright and dull children with respect to the several subjects of the school curriculum. While no objective checks of the opinions are reported, and few are available from other sources, makers of courses of study might well follow Baker's analysis until such time as better evidence is brought to bear on the problems treated.

Wilson (252) makes a careful analysis by means of tests of certain abilities of bright and dull children. He reports that bright children tend to handle ideas well and to learn from reading and discussion, whereas

dull children handle objects relatively better than bright children and learn mainly from manipulation of tools, materials, and objects of interest bearing on the ideas to be learned. This finding is contrary to the findings of Baker, who reports that bright children not only handle ideas better, but they are also superior in handling tools and materials. In other words, their ability is general. However, he does point out that when bright children are held only for the elaborate drill and the standards of skill required of the slow, they work carelessly and seem to have less ability than do slow children. This conflict in findings may be of the same general nature as that pointed out by Thorndike (249) with reference to the correlation between the attitude and speed of intelligence. However, it may be explained better by the conflict in theory as to the potency of insight or repetition in learning arising between Lashley (236) and the *Gestalt* group, on the one hand, and Thorndike on the other. The suggestion for the curriculum maker seems to be that bright children need to be brought to an appreciation of suitable standards of speed and formal excellence in mechanical processes and encouraged to find for themselves and employ in their own good time the exercises needed to reach the standards, whereas dull children like direction, repetition, and imposed standards, and learn best under such conditions. However, they need to be guarded against an excess of formalism.

Monroe and Herriott (240) review the progress in the United States of the idea of differentiation in curricula and courses of study to adapt them to individual interests, capacities, and social needs. These investigators believe that there is a serious attempt being made to adapt secondary education to individual differences. The work of Thorndike (249), Spearman (248), and Kelley (235) should help to give intelligent direction to the movement.

Controversy Over Ability Grouping

During the last decade the practice of grouping children on basis of capacity as determined by mental tests, educational ability as determined by educational tests, teachers' marks or opinions, or some combination of the three, has spread with a rapidity which is alarming to the thoughtful friends of the movement. McGaughy (239), one of the earlier friends of homogeneous grouping, has changed from proponent to hopeful critic and from hopeful critic to active opponent of the movement. He finds that pupils homogeneous with respect to one trait or to the average of several traits are not homogeneous with reference to any other trait. A survey of current practice in secondary schools in Cleveland by Schinnerer (247), analyzed by Connor (230), reveals the fact that Cleveland has, in the past, been open to McGaughy's criticism to an appreciable extent.

Purdom (245) shows that, in six city high schools in Michigan, ability grouping on basis of intelligence tests, school marks, and teachers' opinions had no effect upon the results with any group of pupils, but that

teachers like the plan because it makes their work easier. There is no evidence in Purdom's study that anyone connected with the experiment attempted to take advantage of the opportunity offered by ability grouping to differentiate the courses of study offered.

Kefauver (234) reports the results of a very careful experiment to determine the validity of various bases for classification. He concludes, in substance, as follows: The judgment of teachers in elementary schools is the best basis for predicting success in the first year of the junior high school. General intelligence test I. Q.'s make the best test basis for predicting success in general. Special subject tests are a better basis for predicting success in the several subjects. The general achievement test is high in predicting power.

Lincoln's (238) summary of the situation made early in 1929 probably holds good for 1930. He lists the following difficulties in the use of tests in classification: inertia and resistence to innovation; working out a plan to suit local conditions; ineffective operation after inauguration of plan; and imperfection and transitory nature of any plan which does not provide complete individualization of instruction.

Measuring Achievement

Those who believe most in ability grouping seem to be most anxious about the ultimate adjustment of the curriculum to the individual child. Those who emphasize grouping as the next step in the solution of the problem of adjustment are thinking of the importance of the successful participation of the individual in the group life of equals as a vital part of the curriculum, while those who emphasize individual instruction are thinking of the importance of successful mastery of the more abstract elements of the curriculum at an optimum rate.

Reeve (246) in summing up the research of others, says that general intelligence tests predict success in mathematics as well as special prognosis tests. Achievement tests do a little better than either. Therefore, he would have us work on the improvement of achievement tests. With a sufficient number of such tests, it would be possible to set up individual instruction in high-school mathematics on a scientific basis.

Peters (243) gives the most comprehensive picture of the methods of validating tests in the light of objectives and presents one example from the field of mathematics. He points out how tests of this character might stimulate the cause of eductional reform. Such reform might take the form of eliminating useless material or the introduction of individual instruction, or both. Brueckner (229) locates 21 different important difficulties in the fundamental operations upon decimals. The tests used to locate these difficulties are reported. The implication is that mastery of these difficulties is insufficiently emphasized in present courses of study. Methods are presented for individual diagnosis and treatment.

Washburne (250 and 251) presents detailed plans for the individualization of instruction in reading and spelling. These articles do not report research but rather creative work in setting up plans. Like Washburne's articles just reviewed, other articles on individual instruction represented creative work rather than research. However, Irwin's (233) story of the attempt to adapt the Dalton plan to the platoon organization promises evaluation in terms of test results at a later date. It seems that the introduction of individual instruction on a wide scale, which a development of better tests would make generally practicable, would affect the curriculum more on the side of form and auxiliary devices than on the side of content.

Greene (232) describes the methods of construction and use of new-type tests set in connection with the introduction of new courses of study in Denver. He finds these tests useful in balancing up specific courses as to difficulty, amount, and grade placement of material. Lazar (237) and Nifenecker (242) reveal how diagnostic and remedial work may be carried on in arithmetic. The 1929-30 series of bulletins begins with one on the use of tests in determining levels of achievement and locating difficulties for the group and individual. It continues with another indicating specifically what to look for in test results and what to do about each defect when found. Subsequent bulletins deal with addition and subtraction, multiplication and division, common fractions, decimals, and individual case studies. In this last bulletin eleven cases are reported in detail, illustrating how arithmetic difficulties may be analyzed for the individual pupil and overcome. In the end, evidence is given from results in one school as to the effectiveness of diagnostic and remedial work.

Other problems related to the organization, activities, or materials of the curriculum, which are being studied objectively by means of tests, include the following: A project curriculum for a public elementary school in New York City (233); the Morrison mastery technic and the unit plan of instruction in biology (241 and 244); supervised study in elementary physical science (226); distribution of practice (228 and 253).

Boyer (227) reports a survey of the achievements of Philadelphia high-school pupils. The thoroughness with which the field is covered, the relatively large number of standard tests used, and the ingenuity of the interpretations make this report unusually stimulating, and also useful for comparative purposes in any large city. In a number of other cities research bureaus have made or are making penetrating analyses of courses of study by means of tests. Among the larger ones are Los Angeles and Pasadena on the Pacific Coast and Baltimore and Boston on the Atlantic.

Conclusion

The articles in current professional periodicals range widely in character, usefulness, and scientific merit. At one end of the scale are those in which the author presents a nondescript list of some of the findings or

proposals of educational research together with a description of how the materials or plans were tried in his school, and an expression of the satisfaction or dissatisfaction of teachers and pupils over the trial. At the other end of the scale are those in which the author presents an account, in orderly fashion, of a most carefully controlled experiment, in which reliable objective measures, and sound statistical procedures are used, and in which conclusions are drawn with due regard to the facts established. If one were to go back to the first decade in the present century, he would find professional literature made up almost wholly of subjective material. In the decade just past, the change has been such that the research label has been almost essential to publication in a professional magazine, although hardly five percent of the reports bearing the label have shown a high order of scientific work. These conditions are evidence that the administrative and teaching mind, on the one hand, and the scientific mind, on the other, poles apart at the turn of the century, have come in some measure, to understand each other. This rapprochement reveals the prospect of complete merger in another three or four decades. Such a merger would mean a steady revision of curriculum material in the light of generally accepted objectives on the one hand and objective evidence of "teachability" on the other.

CHAPTER VI

Evaluation of Curricula and Texts

THERE are three distinct aspects to the problem of appraisal of curricula, namely, the appraisal of courses of study in action, the appraisal of course of study bulletins, and the appraisal of textbooks. The task consists of the determination of a number of criteria and the evaluation of the course of study or textbook on these criteria.

Appraisal of Courses of Study in Action

The Denver Public Schools have been engaging in an elaborate program of appraisal of courses of study involving the co-operation of about 1000 teachers. Each course of study is rated on two forms, a printed form common to all, and a mimeographed form for each subject. There are nearly fifty questions on the general form and about fifteen more for each of the subjects. The product of this appraisal will be used in revising the courses of study. The results of the Denver program are not yet published but forms to be used in the appraisal are available.

Bamesberger (255) made an appraisal of the outcomes of a social studies course in the sixth grade in Oklahoma City. The study compares a new activity course with an old subjectmatter course covering the same field on the following points: (1) The results of subjectmatter tests; (2) the amount of voluntary outside reading done; (3) the interests aroused; and (4) the outside instructional activities stimulated by the course. The investigator concludes that pupils taught by an activity course are superior according to these criteria. Barnette (256) collected the replies of pupils to a request that they state in written form what the study of economics meant to them personally. The data indicate that while economics is difficult for high-school pupils they find it valuable.

Appraisal of Course of Study Bulletins

Reinoehl (266) made a critical analysis of forty-four state courses of study for rural elementary schools, including such topics as: (1) The character of the general suggestions; (2) the organization of one-teacher schools: the relative emphasis on several subjects; (3) the selection, arrangement, and correlation of topics; and (4) an analysis of the content of each of the subjects. He points out numerous deficiencies and makes many recommendations. Stratemeyer and Bruner (269) evaluated 9000 courses of study for the kindergarten and first six grades. Research students determined the criteria to be used as a basis for evaluating the

courses of study by listing the points of strength or weakness of 498 courses of study. The judges were 121 research students. All the courses of study in one subject were rated by at least three judges. The outcome of the rating is a discovery of about 200 of the best courses of study.

Harap (262) made an appraisal of the output of courses of study for the years 1928-29. He studied the typography, the inclusion of a procedure, the inclusion of objectives, the form of the unit of work, the inclusion of tests, and provision for individual differences. This study was a purely subjective evaluation to discover certain important curriculum trends.

Evaluation and Selection of Textbooks

Another aspect of the present problem is the appraisal and selection of textbooks. A text is auxiliary to a course of study and its selection depends first upon the content of the latter. Many of the criteria for evaluating curriculum bulletins apply equally to the evaluation of textbooks. The technic of selecting texts is elaborately treated in a half dozen treatises but only objective studies will be summarized here.

A number of studies are limited exclusively to the evaluation of the content of textbooks. Packer (265), Housh (263), and Selke and Selke (267) studied the vocabularies of readers. Spaulding (268) analyzed the contents of six third-grade readers for the presence of problems, processes, occupations, and measures. Woody (271) evaluated five spellers on the basis of the number of words in the Anderson list contained in each. Whitney (270) ranked nine first-grade readers on the following factors: total number of words, frequency of repetition of words, interest element, English element, and feeling element. The first two elements were ranked by experts and the last three by teachers after use in the classroom.

Grant and White (261) compared the content of fifteen school readers with the actual reading interests of children obtained from library data and interviews with children. They found that these readers contained too little material pertaining to animals and fairies, and too much poetry and fables. Lyman (264) studied twenty-four textbooks in language composition for the seventh and eighth grades published since 1920. The criteria were determined by listing certain progressive tendencies in the teaching of language, all of which apparently were taken from the *Reorganization of English in Secondary Schools*, United States Bureau of Education Bulletin 1917, No. 2. Fully one-half of the texts studied are devoted to grammar which is contrary to recommended practice. Oral composition is not adequately treated. The texts appear to make an effort to relate school to life.

The American Association of University Women (254) evaluated sixty history textbooks on such criteria as: military content, political content, economic content, social content, degree of jingoism, accuracy, and so on. Three teachers of history judged each text and no one teacher read more

than three texts. The list of texts is followed by quantitative estimate of the military, political, economic, and social content and informal comment with the criteria as a basis.

From eighteen writers of arithmetic texts, eleven publishing companies, and twenty research departments, Benthack (257) developed a scorecard for rating arithmetic texts. The investigator's composite scorecard consists of items mentioned at least four times. Crofts (258) developed a scorecard for arithmetic texts by using several checks. The first draft was based upon the results of published investigations of arithmetic, all the items found in ten scorecards, and principles found in authoritative works in psychology and education. This scorecard was revised after criticism by authorities in the teaching of arithmetic and was weighted by another group of the same specialists.

Dunn (259) devised a score sheet for the selection of basic texts for the Long Beach City Schools and applied it to the evaluation of fifteen junior high-school texts in mathematics and general science. Twenty points are allotted to mechanical features and eighty to content, which latter includes scholarship, organization, style, and essential topics. The particular strong point of this instrument is its handling of the essential topics of the course. The topics and time allotment for each, taken from the course of study, is the standard with which all texts are then compared.

Another instrument for the evaluation of junior high-school mathematics is reported by Fuller (260) of the Los Angeles City Public Schools. After a first committee set up criteria, six additional committees proceeded to analyze the contents of the books under consideration for (1) content, (2) drills, tests, summaries, reviews, (3) vocabulary, (4) size of numbers, (5) illustrations, and (6) mechanical phases. The several criteria were weighted and the texts were scored and ranked. The data were furnished to the general mathematics committee which voted for the text which had the highest score.

CHAPTER VII

Public and Private School Curricula

A REVIEW of current courses of study shows that progressive practice and subjective opinion are still the chief factors in determining content. However, the results of previous research, measurement, or experimentation and the results of research undertaken for the definite purpose of aiding curriculum building are coming to be used more and more. Courses of study are no longer merely outlines of textbook assignment. They include statements of objectives, pupil activities, expected achievements, and methods of procedure. In this review special emphasis is given to illustrative curricula which have been systematically, thoroughly, and somewhat objectively prepared. Since the published curricula of child-centered schools are manifestly experimental, some of them are also considered.

According to the Curriculum Commission of the Department of Superintendence (287) the organization which will provide the best basis for the determination of curricula should include representatives of the administrative, supervisory, and research groups, classroom teachers, subject-matter specialists, and intelligent, interested citizens who have a constructive attitude toward the public school. Cocking (276) has summarized the functions usually performed by these participants in a program of curriculum revision.

There is need for expert guidance in every program of curriculum revision. Examples of current practice collected by the Department of Superintendence (288) and the National Society for the Study of Education (289) show that in some instances this expert guidance comes from within the school system; at other times, from without.

Public School Curricula

Extensive participation of teachers in curriculum building is essential. Cutright (278) makes it clear that the curriculum expert and his chosen assistants cannot develop courses of study in a handful of selected classrooms and then in turn expect the supervisory group to superimpose this product on a group of teachers who have at no time been taken into the confidence of the small curriculum group.

Among the practical questions on which the *Twenty-Sixth Yearbook* of the National Society for the Study of Education (290) offers an opinion is how much of the curriculum should be built in advance, and how much should develop day by day. It states that part of the curriculum should be

planned in advance which includes (1) a statement of objectives, (2) a sequence of experiences shown by analysis to be reasonably uniform in value in achieving the objectives, (3) subjectmatter found to be reasonably uniform as the best means of engaging in the experiences, and (4) statements of immediate outcomes of achievements to be derived from the experiences. That part of the curriculum from which selection of supplementary experiences and materials are to be used, as conditions locally suggest, should be planned partly in advance and should be made partly as new materials become available. That part of the curriculum which represents the daily life situations and interests from which the immediate specific needs of pupils arise, should be—can only be—made from day to day.

Threlkeld (300) reports these as the four main principles underlying the Denver program of curriculum revision: (1) The participation of the local professional corps must be procured as a basis for the entire program; (2) definite administration and supervision of the local corps is essential; (3) the most advanced educational thought of the profession as a whole should be incorporated; (4) curriculum revision should be continuous. These same principles have been followed more or less closely in scores of other school systems as in Trenton, New Jersey (301); Houston, Texas (281); Baltimore, Maryland (272); State of Missouri (286); and Pittsburgh, Pennsylvania (292).

In Long Beach, California (284), the first draft of a new course of study is written by a supervisor, by a head of a department, or by a classroom teacher released from instructional duties. Writers of courses of study have at their service a curriculum consultant, supervisors, heads of departments, research workers, and teacher committees.

Curriculum Bulletin No. 1 of the St. Louis Board of Education (297) outlines the steps in the St. Louis program of curriculum revision. Among them appear the following: (1) Seventeen underlying principles were developed to guide in the formulation of aims. (2) Statements of general and divisional aims of education were formulated. The aims were set forth in terms of knowledge, habits, ideals, and appreciations. (3) Committees—through careful study and investigations in which they reviewed the conclusions of scientific research in the various fields of curriculum work, the statements of experts, and local curriculum practices—proposed a program of activities in which the child should engage to realize the aims. They also proposed the approximate amount of time the child should spend on each activity.

The Oakland, California, *Hand-Book for Course of Study Committees* (291) outlines principles and procedures with respect to curriculum development, instructions to committees concerning preparation of course of study bulletins, and style for mechanical construction of courses of study.

Many attempts are being made in public school systems, not merely to develop units of work that are socially valuable and at the same time suited to the growth needs of children in each grade, but to break down subjectmatter lines through large group projects and activities through which the various subjects are integrated in children's experiences. For example, a course of study on an activity basis was published by the Los Angeles Board of Education in 1924 (298). This publication was the product of co-operative efforts of supervisors and teachers. The supervisors set up the major objectives and helped the teachers to get live activities under way in their classrooms. As teachers worked these out successfully, they described the procedures in detail and contributed these accounts to the course of study.

Collings (277) reports an experiment in rural school curriculum making in which subjects as these are commonly understood are not taught. His starting point was the actual present life of the boys and girls themselves, with all their interests and desires. Curriculum Bulletin No. 4 (295) of the Raleigh Public Schools, contains a record of experiences and accomplishments in classrooms of Raleigh during a period of four years. Both in content and in form it represents a definite departure from the subjectmatter requirements and instructions usually given to teachers in courses of study.

According to Beatty (273) learning should not be left to chance, hence in Bronxville, goal cards,—containing statements of the outcomes which may be expected in each subject field,—have been developed, setting forth for each grade the abilities or the skills in the more fundamental subjects. The goal card constitutes the basic course of study for the teacher. He must interrelate the main objectives with a problem of major interest, and then lead the children into stimulating situations which will evoke responses through which he can attain his goals. Winnetka (302) offers a similar example of progressive curriculum-construction in a public school system.

Bellows (274) reports the results obtained by using an activity program in thirteen school rooms in Grand Rapids, Michigan, which show that children make normal gains in school subjects as measured by standardized tests—even though subjects, as such, are introduced only when they help the children to carry on the projects in which they are engaged. The things in which the children were already interested formed the projects to be undertaken in this experimental curriculum.

Experimental Curricula

Experiments such as the above are far more common in private laboratory schools than in public schools. In general, laboratory schools emphasize play, practical activities, creative expression, group co-operation, and the use of environment and current questions as sources of stimulation

to a greater degree than do most public schools. An appraisal of "child-centered" schools has been prepared by Rugg and Shumaker (296).

There are outstanding differences in curriculum making in laboratory schools. Wells (303) describes a curriculum organized on the basis of large projects, followed by appropriate minor projects growing out of the larger. Similarly at the University of Missouri Elementary School, Meriam (285) and his associates developed a curriculum in which the content was taken directly from the out-of-school interests and activities of children. Burke (275) presents a conduct curriculum for the kindergarten and first grade in which the activities in each subject are listed in one column. Opposite are listed the desired changes which grow out of these activities.

Pratt (293) reports that in the City and Country School, the teachers select the large activities and probable subjectmatter needed in advance. The children accept these activities and help to work out the details through the year. A record is kept as the work evolves. For the very young children, the group records of the City and Country School (294) are an attempt to reproduce an experimental curriculum as it develops from month to month in a given year. Rough notes, taken in the classroom, are written up after school hours, then summarized and typed at the end of weekly or monthly periods. Stott (299) reports how the running of a school store is made the center and motive power of the school curriculum of a group of eight-year olds.

Keelor (282) describes a curriculum which grew out of the making of a play city in the second grade with special attention to the development of reading, written English, spelling, and number as integral parts of the program of activities. The elementary division of the Lincoln School (283) has sought to develop newer curriculum material, growing out of the interests of children and centering about rather large and meaningful units of work. They have set up eight criteria for selecting these units.

In the elementary school of the University of Iowa (280) the curriculum is, for the most part, made in advance by the teaching and supervisory staffs, and is organized on a subject basis. This practice is also true of the Francis W. Parker School (279) of Chicago. The curricula of both of these schools, however, make large provision for the needs of individual pupils.

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